

order to adjust a clarity and/or focus of Applicant's claimed invention. For example, Claims 1-13 and 40-45 has been cancelled without prejudice or disclaimer of any scope or subject matter, and new Claims 52-64 are submitted herein to adjust a clarify of Applicant's claimed invention. The amendments to the claims are unrelated to any prior art or scope adjustment, and are simply clarified claims in which Applicant is presently interested. Therefore, at entry of this paper, Claims 14-39 and 46-64 are pending for further examination in this case, with Claims 19, 24-26, 32, 37-39 and 50 presently withdrawn from consideration.

CONTINUED TRAVERSAL OF RESTRICTION/ELECTION

Applicant and the undersigned respectfully continue to traverse the standing Restriction/Election, for at least the reasons set forth in the sections to follow.

REASONABLE NUMBER OF SPECIES WITH GENERIC CLAIM

Despite the Restriction/Election being made final, it is respectfully submitted that 37 CFR §1.141 provides that more than one species of an invention, not to exceed a reasonable number, may be specifically claimed in different claims in one application, providing the application also includes an allowable generic claim to all of the claimed species, and all claims to the species in excess of one are written in dependent form or otherwise include the limitations of an allowable generic claim. Applicant believes that at least presently-pending Claims 14 and 46 are allowable and generic, and that all other pending claims contain the limitations of such generic claims. Therefore, Applicant respectfully submits that the election of species requirement should be withdrawn and all claims considered and allowed.

**WITHDRAWN DEPENDENT CLAIMS ARE RELATED BY DEPENDENCY:
NO SERIOUS BURDEN FOR EXAMINATION**

As pointed out in §803 of the Manual of Patent Examining Procedure, if a search and an examination of an entire application can be made without serious burden, the Examiner must examine the application on the merits even though the application includes (assuming *arguendo*) claims to distinct or independent inventions. It is respectfully submitted that a serious burden cannot be shown at this time owing to the fact that the withdrawn claims are dependent claims (and would be allowable if their respective base claims are allowable).

DRAWING OBJECTIONS

Submitted herewith are proposed corrections to the drawings in red, specifically, to Figures 2 and 5-7, which are described as follows.

In Figure 2, the pins 130 have been identified.

In Figures 5-7, in the areas where an "x" appears, it is proposed to remove all of the shading in the areas and to leave the areas blank, due to the multiple materials possible for use, *e.g.*, such as for the laminate layers 514, 516, as well as due to the small size of the sections in the figures and the loss of detail that would occur in attempting the hatch them, *e.g.*, in ground and signalling interconnects 517 and lands 591. Core 512 has been hatched for resin, and pins 130 and vias 518, 518' and 518'' have been hatched for metal, both as one possible material for use in these elements in accordance with the invention. Die 120 has been specially hatched to differentiate it from the remainder of the components, and underfills 125 and 242 have been stippled to differentiate them from the other elements, as they also may be of different materials in accordance with the invention. In Figure 6, the

hatching has been removed from stiffener 990 to indicate that it may be of any material in accordance with the invention, and insulator material 992 has been appropriately hatched.

Applicant respectfully submits that the presence of shading in the informal drawings as filed with the present application would have been changed in the formal drawings to be filed upon allowance of this case even without an objection raised thereto, and courteously notifies the Office that such formal drawings will be prepared by an experienced patent draftsman to be in complete compliance with drawing requirements. Therefore, Applicant respectfully submits that the drawing objection set forth in the 3 July 2002 Office Action has been overcome by the proposed corrections to Figures 5-7, and courteously requests withdrawal of the objections and approval of the proposed changes to the drawings submitted herewith.

REJECTION UNDER §112, 2ND PAR. OBVIATED/TRAVERSED

One of Applicant's claims have been rejected under 35 USC §112, second paragraph, as being indefinite for the concerns listed at Item 4 spanning pages 3 and 4 of the Detailed Action. Unrelated to any prior art rejection, Claims 3, 8-9, 42 and 45 have now been canceled without prejudice or disclaimer, thus rendering the rejection moot at this time. Claims 16 and 29 have been carefully reviewed and carefully amended where appropriate in order to address the Office Action listed concerns.

Regarding the rejection of Claims 21 and 34, traversal of the §112 rejection is appropriate, as the double recitation of “when mounted” existed only in Claim 8, and is not present in Claims 21 and 34.

Regarding the rejection of Claims 9, 22, 35 and 51 as being unclear as to what is meant at the emphasized language at lines 2 and 3 on page 4 of the Detailed Action, *i.e.*, “being disposable to co-support a heat sink. The examiner understood that the stiffener supports a heat sink.”, traversal is appropriate. More particularly, it is respectfully submitted that a stiffener may or may not support a heat sink. As one example, if the heat sink has a size corresponding only to the die size and does not extend outward farther so as to overlap the stiffener, then the stiffener will not co-support the heat sink. Accordingly, it is respectfully submitted that the claim language emphasized in the Action is both accurate and clear.

As the foregoing is believed to have addressed all §112 second paragraph concerns, reconsideration and withdrawal of the §112 second paragraph rejections are respectfully requested.

ALL REJECTIONS UNDER 35 USC §§102 AND '103 - TRAVERSED

All 35 USC rejections (*i.e.*, the 35 USC §102 rejection of ones of the claims as being anticipated by Lim *et al.* (U.S. Patent 6,020,221); and, the 35 USC '103 rejection of ones of the claims as being unpatentable over Lim *et al.* in view of Baba *et al.* (U.S. Patent 6,313,521)) are respectfully traversed. However, such rejections have been rendered moot by the present clarifying amendments to Applicant's claims, and accordingly, traversal arguments are not appropriate at this time.

However, Applicant respectfully submits the following to preclude renewal of any such rejections against Applicant's clarified claims.

All descriptions of Applicant's disclosed and claimed invention, and all descriptions and rebuttal arguments regarding the applied prior art, as previously submitted by Applicant in any form, are repeated and incorporated hereat by reference. Further, all Office Action statements regarding the prior art rejections are respectfully traversed. As additional arguments, Applicant respectfully submits the following.

Unrelated to any prior art rejection, Claims 1-13 and 40-45 have now been cancelled without prejudice or disclaimer, thus rendering this rejection of such claims moot at this time. Patentability of remaining ones of the rejected claims is supported as follows.

Thin-core and/or coreless packaging arrangements are emerging (new) technologies being worked on heavily by the Assignee of the present application, and the terms "thin core" and "coreless" are directed to very specific (new) packaging technologies. As an example and for teaching purposes, submitted herewith as "Exhibit A" is a copy of a 13 September 2002 publication authored by Kevin Teixeira of Intel Corporation, and titled "Bumpless Build-Up Layer Packaging Technology". The diagram on page 2 of such publication illustrates a standard cored arrangement, whereas the diagram on page 3 illustrates a coreless (or thin-core) arrangement.

Applicant's disclosed and claimed invention is directed to the combination invention of a thin-core or coreless packaging arrangement. That is, the present invention is directed to a thin-core or coreless integrated circuit printed circuit board

(IC-PCB) carrier package having both a thin-core or coreless substrate, and a stiffener to provide stiffening support to the one of a thin-core and coreless substrate.

In order to properly support a §102 anticipatory-type rejection, any applied art reference must disclose each and every limitation of any rejected claim. The applied art does not adequately support a §102 anticipatory-type rejection because, at minimum, such applied art does not disclose (or suggest) the following discussed limitations of Applicant's claims.

Turning to rebuttal of the primary reference to Lim *et al.*, It is respectfully submitted that Lim *et al.* does not adequately support the §102 anticipatory-type rejection (or a §103 obviousness-type rejection) because it appears directed to be directed to a standard cored arrangement, and nowhere does Lim *et al.* mention "thin-core" or "coreless" substrates.

Turning next to rebuttal of the secondary §103 reference, Baba does not cure the deficiency mention above with respect to the primary reference to Lim *et al.*, *i.e.*, Baba also does not disclose or suggest "thin-core" or "coreless" substrates. Instead, Baba appears to have been cited merely for its teachings as to a heat sink arrangement.

Given the fact that neither of the applied references discloses or suggests the new "thin-core" or "coreless" substrate technologies, it is respectfully submitted that no combination of Lim *et al.*/Baba would have disclosed, suggested or resulted in Applicant's disclosed and claimed invention.

As a result of all of the foregoing, it is respectfully submitted that the applied art would not support a §102 anticipatory-type rejection or §103 obviousness-type

rejection of Applicant's claims. Accordingly, reconsideration and withdrawal of such §§102 and 103 rejections, and express written allowance of all of the rejected claims, are respectfully requested.

INDICATION OF CHANGES MADE

Amendments made herein to the application are shown in the attached "Appendix A-Marked Version" by underlining and brackets to indicate additions and deletions, respectively.

EXAMINER INVITED TO TELEPHONE

The Examiner is invited to telephone the undersigned attorneys at the Washington, D.C. area telephone 703-312-6600 to discuss an Examiner's Amendment or other suggested actions for accelerating prosecution and moving the present application to allowance.

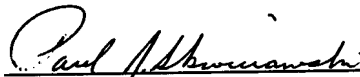
CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully submits that the claims listed above as pending in the application, including the claims listed as being presently withdrawn from consideration, are now in condition for allowance. Accordingly, early allowance of such claims is respectfully requested.

No Petition is required for the filing of this Amendment. Further, Claims 1-13 and 40-45 (19 claims/2 independent) are cancelled herein, and new Claims 52-64 (13 claims/1 independent) do not exceed the total or number of independent claims cancelled. Therefore, no claim fees are required for entry of this Amendment.

To whatever other extent is actually necessary, Applicant petitions for an extension of time under 37 CFR §1.136. Please charge any shortage in the fees due in connection with the filing of this paper to ATS&K Deposit Account No. 01-2135 (referencing case No. 219.40241X00).

Respectfully submitted,



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ATTACHMENTS:

Appendix A-Marked Version
Exhibit A ("Bumpless Build-Up Layer Packaging Technology")
Copies of Figures 2 and 5-7 with Proposed Corrections in Red

APPENDIX A-MARKED VERSION**IN THE CLAIMS:**

Please amend the claims as follows. Note that the full text of all claims (including those not being amended within this paper) may also be included to provide the convenience of a complete set of claims for easy review:

Please cancel Claims 1-13 without prejudice or disclaimer of any scope or subject matter.

14. (Amended) A thin-core or coreless integrated circuit printed circuit board (IC-PCB) carrier package [comprising:] having one of a thin-core and coreless substrate, and a stiffener to provide stiffening support to the one of a thin-core and coreless substrate, [of the IC-PCB carrier package.]

15. (Amended) A thin-core or coreless IC-PCB carrier package as claimed in claim 14, the IC-PCB carrier package being one of a flip chip pin grid array (FC-PGA) and a flip chip ball grid array (FC-BGA) carrier package.

16. (Amended) A thin-core or coreless IC-PCB carrier package as claimed in claim 14, where the stiffener is substantially made of at least one of a [metal-like] metal, [plastic-like] plastic, [glass-like] glass and [ceramic-like] ceramic material, is one of a molded, stamped, etched, extruded and deposited stiffener, and is capable of withstanding high temperatures of at least one of an IC die bonding operation and normal IC operation.

17. (Amended) A thin-core or coreless IC-PCB carrier package as claimed in claim 14, the stiffener being planar and mounted to a die-side major planar surface of the substrate.

18. (Amended) A thin-core or coreless IC-PCB carrier package as claimed in claim 14, the stiffener having an internal window therein to provide clearance for at least one of a die, under-fill, die side components (DSC), and integrated heat spreader (IHS).

19. (Amended; withdrawn from consideration) A thin-core or coreless IC-PCB carrier package as claimed in claim 14, the stiffener being a multi-part stiffener.

20. (Amended) A thin-core or coreless IC-PCB carrier package as claimed in claim 14, the stiffener having an above-substrate-plane height, which is less-than or equal to an above-substrate-plane height, when mounted, of one of: an IC-die, and a combination of an IC-die with an integrated heat spreader (IHS).

21. (Amended) A thin-core or coreless IC-PCB carrier package as claimed in claim 14, the stiffener having a top surface above a substrate-plane, which is substantially co-planar with, when mounted, a top surface of one of: an IC-die, and a combination of an IC-die with an integrated heat spreader.

22. (Twice amended) A thin-core or coreless IC-PCB carrier package as claimed in claim 21, the stiffener being disposable to co-support a heat sink, with one of: an IC-die, and a combination of an IC-die with an integrated heat spreader (IHS).

23. (Amended) A thin-core or coreless IC-PCB carrier package as claimed in claim 14, where if a main body of the stiffener is electrically conductive, the stiffener further includes an insulator to electrically insulate electrical members on stiffener-opposing areas of the substrate.

24. (Amended; withdrawn from consideration) A thin-core or coreless IC-PCB carrier package as claimed in claim 14, the stiffener being an edge stiffener mounted to minor-planar side-surfaces of the substrate.

25. (Amended; withdrawn from consideration) A thin-core or coreless IC-PCB carrier package as claimed in claim 14, the edge stiffener having a non-flat cross section which is mated with the side-surfaces of the substrate.

26. (Amended; withdrawn from consideration) A thin-core or coreless IC-PCB carrier package as claimed in claim 14, where the edge stiffener is pre-attached to the substrate by an IC-PCB carrier package manufacturer.

27. (Amended) A packaged integrated circuit (IC) comprising:

an IC, and a thin-core or coreless integrated circuit printed circuit board (IC-PCB) carrier package [comprising] having one of a thin-core and coreless substrate, and a stiffener to provide stiffening support to the one of a thin-core and coreless substrate, [of the IC-PCB carrier package.]

28. A packaged IC as claimed in claim 27, the IC-PCB carrier package being one of a flip chip pin grid array (FC-PGA) and a flip chip ball grid array (FC-BGA) carrier package.

29. (Amended) A packaged IC as claimed in claim 27, where the stiffener is substantially made of at least one of a [metal-like] metal, [plastic-like] plastic, [glass-like] glass and [ceramic-like] ceramic material, is one of a molded, stamped, etched, extruded and deposited stiffener, and is capable of withstanding high temperatures of at least one of an IC die bonding operation and normal IC operation.

30. A packaged IC as claimed in claim 27, the stiffener being planar and mounted to a die-side major planar surface of the substrate.

31. A packaged IC as claimed in claim 27, the stiffener having an internal window therein to provide clearance for at least one of a die, under-fill, die side components (DSC), and integrated heat spreader (IHS).

32. (Withdrawn from consideration) A packaged IC as claimed in claim 27, the stiffener being a multi-part stiffener.

33. A packaged IC as claimed in claim 27, the stiffener having an above-substrate-plane height, which is less-than or equal to an above-substrate-plane height, when mounted, of one of: an IC-die, and a combination of an IC-die with an integrated heat spreader (IHS).

34. A packaged IC as claimed in claim 27, the stiffener having a top surface above a substrate-plane, which is substantially co-planar with, when mounted, a top surface of one of: an IC-die, and a combination of an IC-die with an integrated heat spreader.

35. (Amended) A packaged IC as claimed in claim 34, the stiffener being disposable to co-support a heat sink, with one of: an IC-die, and a combination of an IC-die with an integrated heat spreader (IHS).

36. A packaged IC as claimed in claim 27, where if a main body of the stiffener is electrically conductive, the stiffener further includes an insulator to electrically insulate electrical members on stiffener-opposing areas of the substrate.

37. (Withdrawn from consideration) A packaged IC as claimed in claim 27, the stiffener being an edge stiffener mounted to minor-planar side-surfaces of the substrate.

38. (Withdrawn from consideration) A packaged IC as claimed in claim 27, the edge stiffener having a non-flat cross section which is mated with the side-surfaces of the substrate.

39. (Withdrawn from consideration) A packaged IC as claimed in claim 27, where the edge stiffener is pre-attached to the substrate by an IC-PCB carrier package manufacturer.

Please cancel Claims 40-45, without prejudice or disclaimer of any scope or subject matter.

46. A thin-core or coreless integrated circuit printed circuit board (IC-PCB) carrier package [comprising:] having one of a thin-core and coreless substrate, and a stiffener secured onto the at least one of a thin-core and coreless substrate of the integrated circuit printed circuit board (IC-PCB) carrier package to provide stiffening support thereto.

47. (Amended) A thin-core or coreless IC-PCB carrier package as claimed in claim 46, the IC-PCB carrier package being one of a flip chip pin grid array (FC-PGA) and a flip chip ball grid array (FC-BGA) carrier package.

48. (Amended) A thin-core or coreless IC-PCB carrier package as claimed in claim 46, the stiffener is substantially made of at least one of a [metal-like] metal, [plastic-like] plastic, [glass-like] glass and [ceramic-like] ceramic material, is one of a

molded, stamped, etched, extruded and deposited stiffener, and is capable of withstanding high temperatures of at least one of an IC die bonding operation and normal IC operation.

49. (Amended) A thin-core or coreless IC-PCB carrier package as claimed in claim 46, the stiffener being planar for mounting to a die-side major planar surface of the substrate.

50. (Amended; withdrawn from consideration) A thin-core or coreless IC-PCB carrier package as claimed in claim 46, the stiffener being a multi-part stiffener.

51. (Amended) A thin-core or coreless IC-PCB carrier package as claimed in claim 46, the stiffener being disposable to co-support a heat sink, with one of: an IC-die, and a combination of an IC-die with an integrated heat spreader (IHS).